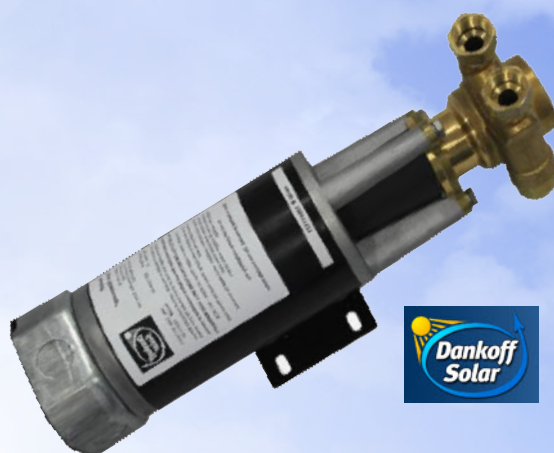


Catalog And Technical Guide: Innovative Water Pumps and Solar Energy Equipment for Homestead, Farm, and Village Use

With Diagrams, Q&A, and Performance Data



***The High Lifter Water Pump.
uses no fuel or electricity,
page 3***



***The SlowPump, a proven design
for homestead water pumps,
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***The Handy Well Pump, a
simple, affordable
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***Shurflo Solar electric
submersible pump for
wells or tanks,
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Hello Friends,

Many people are becoming aware of the need for self-reliance and energy independence in our increasingly unstable economy and environment. My own prediction is that 2013 will begin a period of national debt crisis brought about by our politicians' inability to reduce budget and trade deficits. From my experience as a rural homesteader for many years, I believe that those who are skilled in country living will be better equipped to weather the problems generated by this crisis. Those who can use local resources to provide food, shelter, energy, and other necessities of life for themselves and their families may have a better life than those who must rely on crumbling national institutions. I guess this puts me in the "prepper" camp and so be it. I urge everyone, whether you are a rural resident or city dweller, own or rent, to prepare for the coming earth changes by growing or storing food, laying in emergency supplies, securing water and electricity, providing for your family's security, and helping your friends and neighbors to take these steps.

If you live in the country, you may already provide your own water, either from a well or a spring. This catalog can help you provide that water in an energy-independent way that does not rely on the utility grid or purchased fuel. I offer several kinds of water pumps:

- 1) The High Lifter, the water powered water pump which uses no fuel or electricity
- 2) The Handy Pump, a hand-operated well pump in case the electricity goes out
- 3) The Grundfos SQFlex, a premium quality solar electric submersible well pump
- 4) The Seaflo, an economical solar electric submersible well pump

As well, I can help you put together a pumping system which is specifically designed for your needs. Just give me a call or send me an email. Let's talk.

Here to help with your water pumping needs,



Thad Horner
High Lifter Pump Service
707-923-2109
info@highlifterpumpservice.com

Talk with me in person at
various events in California
and other states, email for
schedule



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The Story of the High Lifter Water Pump



Many years ago, a woman bought a beautiful piece of land on the top of a hill. The view was great -- but the only water available was in a spring far below her home site. She asked her neighbors for advice, but they were all using gasoline powered pumps, which were all that was available at that time for land which was off the grid. She loved her land but was not looking forward to constantly having to hike downhill to fuel the pump. And she didn't move to the country just to have to hear a noisy pump running. And she also didn't want to have to worry about fire danger.

Her brother just happened to be a Physics Major at UC Berkeley, so she thought maybe he'd have some ideas. Well, he thought about the situation and put his physics knowledge to work. He realized that he needed a source of energy to run the pump which wasn't fuel based, or even solar based, since the spring was in a deep forest. He knew that water, under pressure, had energy. If he could somehow use water pressure from the spring to run the pump motor.....

Then he flashed on the idea of the "Hydraulic Lever", a basic principle of physics discovered by Blaise Pascal in 1652. He laid out a pipe going downhill from the spring, filled it with water from the spring, then measured the pressure at the bottom of the pipe. Then he knew he had his energy source! The water pressure could be used to run pistons back and forth, acting as the pump's motor. These pistons then push on smaller pistons, which pump the water uphill.

Based on these discoveries, he built the first prototype of the High Lifter Water Pump, installed it, and it worked! His sister finally had water at her hilltop home, using a pump that worked 24/7 with minimal maintenance and no fuel needed. Then, some of the neighbors wanted these new pumps, too. That's when the High Lifter Water Pump went into production. Soon after, it became very popular in mountainous areas of Northern California. Now High Lifters are in use in many other parts of the world. These simple, low tech pumps are suitable wherever there are mountains and water.

If you are thinking about buying a water pump for your homestead, farm, or village water system, the following pages have important information which will help you decide if a High Lifter Water Pump is right for you.

How does a High Lifter work?

Every pump needs a power source to operate. Many pumps use gasoline or electricity to operate a motor which powers the pump head. The High Lifter's pump is powered simply by water pressure and uses no fuel, electricity, wind, or solar power.

How much water will the High Lifter pump and how high does it lift?

The 2" High Lifter is designed for residential and light agricultural use. Output depends on fall, lift, and flow; the average is 400-800 gallons per day (GPD) and the maximum is 750-1,500 GPD. The High Lifter is capable of 950 foot lifts if the inlet pressure is 60 psi. It can operate with as little as 13 psi but will not pump nearly as high or as much.

How does the High Lifter compare with "Ram" pumps?

The High Lifter is not a ram and has many advantages over the old ram type pump. The High Lifter is a piston pump which is more energy efficient, quieter, self starting, always in tune, and often less expensive than a ram. Unlike the ram, the High Lifter can operate on very low flows and is not troublesome. It often pumps more water than a ram. This is particularly true in situations such as limited summer flow and/or high lift, where the ram may not work at all. Also, Ram pumps are much noisier than a High Lifter.

How does a High Lifter compare economically to a gas pump?

For high lifts, the initial cost of the High Lifter pump is equal to or less than a gas pump. For low lifts, it may be possible to purchase a gas pump for a lower initial cost. Experience shows, however, that the whole system could cost more than the High Lifter. Gas pumps usually require an extra reservoir at the collection point, a larger diameter pipeline, as well as gas, oil, etc. Also, overloaded gas pumps have a notoriously short service life between rebuilds. Operation and maintenance costs make almost all gas pump installations more expensive in the long run.

How does the High Lifter compare economically with an electric pump?

The High Lifter provides savings compared to most electric pump systems except for those having access to public power. Even for people with public power whose lifts are over 500 feet, the cost of the High Lifter is attractive.

What kind of maintenance does the High Lifter require?

The filter needs to be cleaned periodically, depending of the water source, but the pump itself needs no priming. After millions of strokes (or one to three years of use) the High lifter begins to show wear on its plastic pistons, which are easily replaced by the user.

After a few piston replacements, some metal parts may need to be replaced. The High Lifter is designed to be owner maintained. All necessary parts are available from High Lifter dealers.

What precautions should be taken to ensure long lasting performance from the High Lifter?

A filter is included with the pump. Install it near the pump. If the water has silt, grit, or sediment, it is wise to have some sort of a settling tank at the water source. We can furnish you with a suggested design for this. In cold winter areas, protect it from freezing by locating the pump below the frost line and/or covering it.

What are the most common problems?

- 1) Sometimes air bubbles get trapped in input lines where the gradient is too shallow. The best prevention is to lay the input line so that there are no air pockets.
- 2) Low flows from springs in the late summer may limit the output of the High Lifter.
- 3) Excessive algae buildup in pond water may necessitate cleaning the filter frequently.
- 4) Animals chewing on lines
- 5) Freeze damage

Will the High Lifter work with a well as the water source?

No. The High Lifter needs pressurized water to operate. This means water piped from a water source located above the High Lifter. The High Lifter will pump a portion of that water to a tank that's higher than the water source.

Do I need a tank at the top?

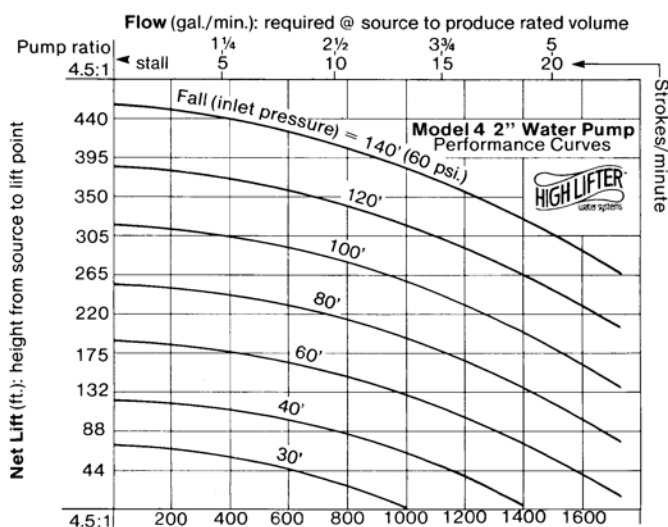
It is possible to run an irrigation system without a tank on top if it's ok for the water to flow constantly on to the orchard or garden. For household use some reservoir is desirable.

Why is only a percentage of the water (that which goes through the High Lifter) pumped uphill?

The High Lifter uses a large amount of water under low pressure to pump a smaller amount of water under high pressure.

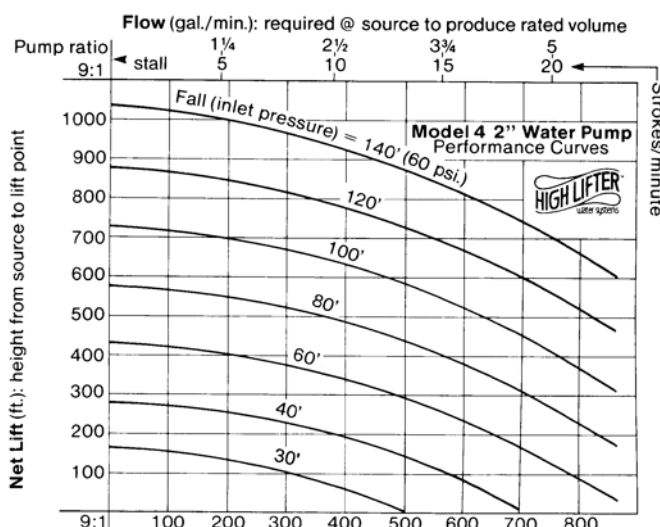
Output Charts for the High Lifter

4.5:1 model



1 psi = 2.3' Delivery (gal./day): assuming adequate water @ source

9:1 model



1 psi = 2.3' Delivery (gal./day): assuming adequate water @ source

For example, using the 4.5:1 chart, suppose you need to pump to 220 feet above your water source and you need 800 gallons per day. Find the 220 foot horizontal line on the chart, then follow the line until it intersects with the 800 gpd vertical line. The intersection is just above the 80 foot curve. This shows that the pump will need to be located about 82 feet below the water source.

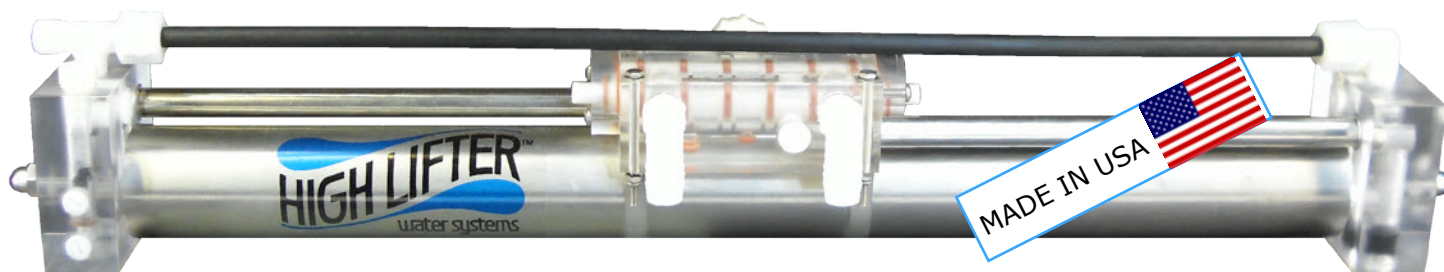
Most High Lifters are installed in hilly or mountainous terrain. This is because the water source must be above the High Lifter. For example, if you want to pump up to 500 feet, you would need to locate the High Lifter 80 feet below your water source, and the 9:1 pump would be recommended. See the output charts below. Also, the High Lifter uses more water than it pumps. It uses this water as an energy source to drive the pistons that multiply the pressure. For example, the 9:1 High Lifter would use 9 times the output gallons, or 3,780 gallons per day, to pump 420 gallons to your tank. The water it uses to power itself is ejected through discharge pipes on the side of the pump, and must be able to flow away freely from the pump. This waste water cannot be used to power a hydro turbine or other pump, but it can be used to fill a tank below it. The pump uses a large amount of water under low pressure in order to pump a small amount of water under high pressure. Thus the High Lifter is not suited to situations where source water is limited to less than 400 gallons per day.

The High Lifter will not operate on flat land since it needs pressure to operate. The “force” of water from a rapidly flowing stream will not develop enough pressure to operate the High Lifter. It will also not suck water from any water source. The water source must always be higher than the High Lifter. The water source must be at least 33 feet above the pump in altitude difference in order to get the pistons moving. More than 33 feet is usually required to develop enough output pressure for most applications. Typically if you need to pump up to 200 to 950 feet, the water source must be 50 to 160 feet above the pump. See the Output Charts for more details.

To increase output, locate the High Lifter further down the hill from the water source. This increases inlet pressure and makes the pump work faster. The “fall” pipe is the pipe that is used to deliver water from the water source to the pump. The size of the fall pipe should be at least ¾ inch in diameter. Larger size pipes can be used for long runs over 1000 feet. The “Lift” pipe is the pipe from the pump to the high tank. The lift pipe is typically ½ inch for runs of less than 1000 feet. Larger pipe is OK but gpm delivered will be about the same. Use either black poly or pvc pipe depending on pressure needed.

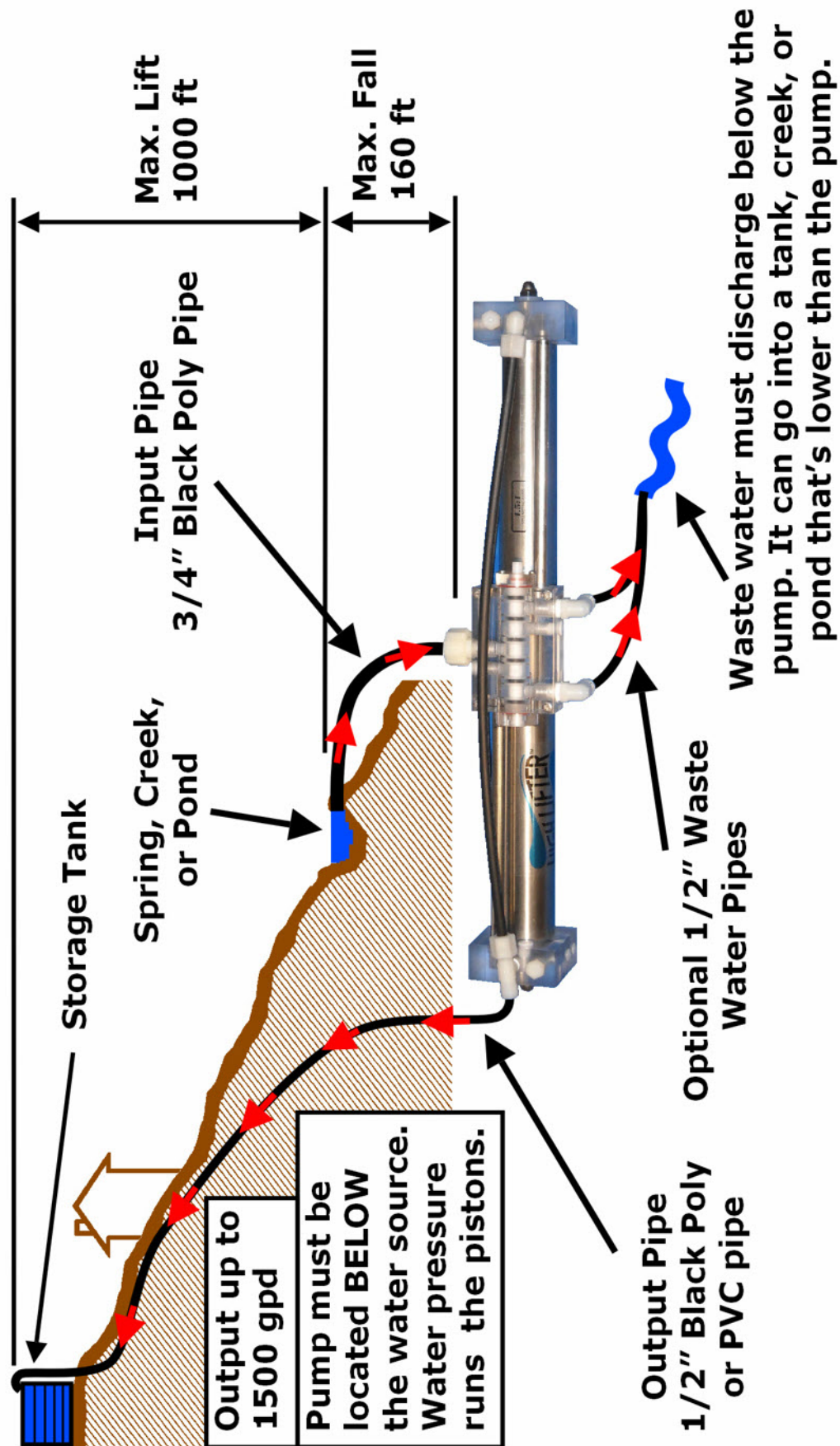
Always use the 120 micron water filter supplied with the pump, and better yet, also allow the water source to run through a tank or barrel to settle out grit.

One year warranty.



10-1008 High Lifter 4.5:1 Model.....\$895.00

10-1009 High Lifter 9:1 Model.....\$895.00



The High Lifter Water Pump can be set up easily with a few simple tools and procedures. A good place to start is with the pipe that you will use. You will need to lay out a pipe for the water from your source and a pipe for the output water to your upper tank. Usually a 3/4" pipe is fine for the source pipe. A 1/2" pipe is standard for the pipe to your upper tank. You can use bigger diameter pipe if you like. Usually either polypropylene "black poly" or PVC pipe will work fine. Black poly is usually rated from 80 to 100 psi, which means if your total lift (elevation difference between High Lifter and upper tank) is more than 230 feet, you should probably use PVC. Or use PVC or the lower part of the run and the less expensive black poly for the upper part. In any

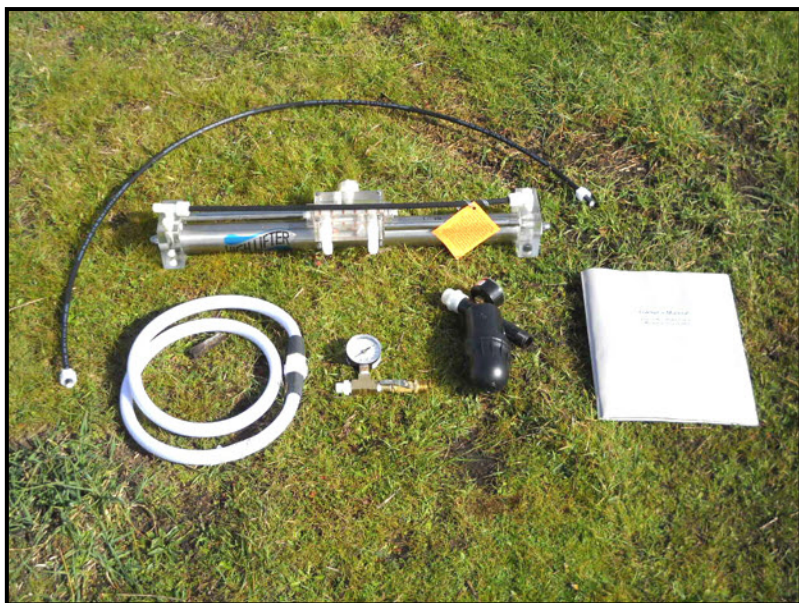


If you've got spring water, or a stream, or a pond that can gravity feed to your High Lifter, you've got your water source.

This odd looking contraption is a settling tank made from two olive barrels. Clean water comes off the top of the first barrel and goes in the bottom of the second barrel for further settling. Very useful for cleaning stream water, which has lots of abrasive dirt which can damage the pump and reduce the need for expensive repairs later. You can find out more about settling tank design and lots of other tech info at www.highlifterpumpservice.com or check out the Owner's Manual.



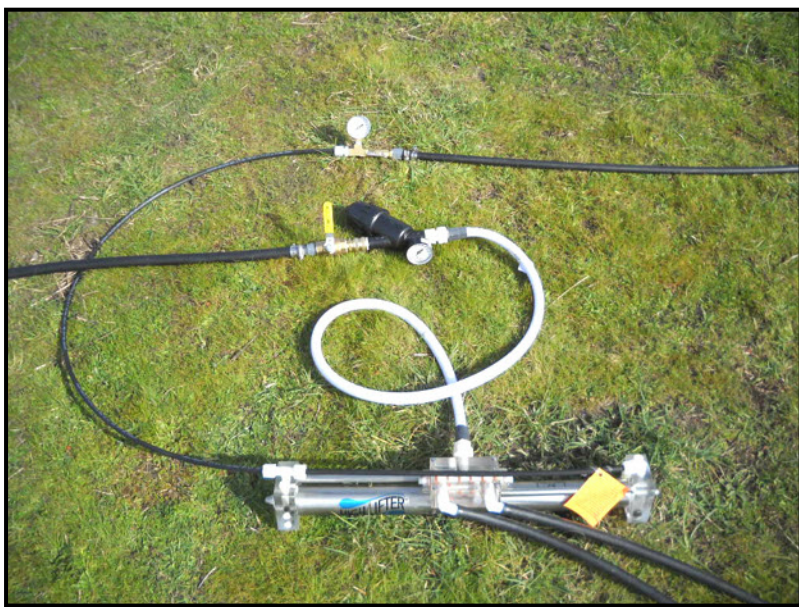
You will probably want to install a valve on the end of the source line. It's convenient to put a brass fitting with garden hose threads on it. Then you can easily detach the filter assembly from it. In that case, you will also need a 3/4" brass garden hose to pipe thread adapter. After you've got your water lines laid out, it's a good idea to check flow and water pressure. Fill your source line and let the water run freely to purge air bubbles out of the line. Air trapped in the line can seriously reduce water pressure. Then shut off the water and check pressure with a gauge. You can use the gauge on the inlet filter if you put a hose cap on the other end of it. You can also buy these gauges from garden supply stores.



Inlet Hose, Outlet Tube, Filter, Outlet Gauge, and Instruction Manual are included with the pump.



Black polyethylene pipe works fine for many High Lifter applications.



All connected. Note the 3/4" pipe to the filter, the 1/2" pipe to the high tank, and the two (optional) discharge pipes connected to the valve body.



Got that water pressure! 33 lbs on the inlet side converts to 190 lbs on the outlet side of this 9:1 pump. That means 430 feet of lift. A successful installation.

The Dankoff Solar SlowPump was the world's first commercially available low power solar pump. It was developed by Windy Dankoff in 1983, in response to those who said "that's impossible." Thousands of Solar SlowPumps have been installed worldwide by ranchers, homeowners, missionaries, health workers, and government agencies. Some of the oldest Solar SlowPumps are still in use today.

The Solar SlowPump is used to draw water from shallow wells, springs, cisterns, tanks, ponds, rivers, and streams, and push it as high as 450 vertical feet and through miles of pipeline. Output is from 200 to 2,600 gallons per day depending on the model.

The Solar SlowPump is less expensive than most submersible DC pumps, and made in a much wider range of sizes. Wearing parts typically last 5 to 10 years. Overall life expectancy is 15 to 20 years.

Suction capacity:

20 vertical feet at sealevel; subtract 1 foot for every 1000 feet of altitude (1 meter for every 1000 meters). The pump should be installed as close to the water source as possible to reduce suction lift.

Construction and Features:

- Rotary Vane mechanism (positive displacement) mad of forged brass, carbon-graphite, and stainless steel
- NSF Approved for drinking water
- Handles sea water and dissolved minerals
- Survives most freezes
- Permanent magnet, brush-type motor for maximum energy efficiency
- DC (Direct Current) motors are standard
- Models with an AC motor are an available option and use a low-surge motor that greatly reduces starting surges, inverter size, and wire size requirements
- The Installation and Service Manual is highly detailed and illustrated



Array Direct (no battery) applications:

- Rated power of the PV Array must meet the watts listed in the PV Watts column in the chart on the next page.
- A pump controller is usually required and will increase system performance by 30% over the course of a year.

Filtration Requirement:

This pump cannot tolerate dirt. The intake water must be filtered clear. Failure to use a Dankoff Solar Pump Filter Unit will void the warranty of the pump. If the water is very dirty, preclean it by running through a settling tank, or use a more dirt tolerant pump from Dankoff such as the SolarForce, the SunCentric, or the Solaram, also available from High Lifter Pump Service.

Warranty:

One year against defects in materials and workmanship.

Model Series	1300	1400	2500	2600
Dimensions	5 ¾ x 17 ¾	6 ½ x 18 ¾	5 ¾ x 17 ¾	6 ½ x 18 ¾
Fittings	½ " Female	½ " Female	¾ " Male	¾ " Male
Weight	12 lbs	25 lbs	13 lbs	29 lbs

1/5 HP Models	Model 1322		Model 1308		Model 1303		Model 2507	
Feet	GPD	Watts	GPD	Watts	GPD	Watts	GPD	Watts
20	150	40	380	40	750	65	1200	80
40	150	45	380	65	750	80	1190	100
60	150	45	360	70	730	90	1170	130
80	150	50	360	80	710	110	1170	150
100	150	65	360	85	700	130	1160	180
120	140	65	360	90	700	140	1140	210
140	140	70	360	95	680	160	1100	245
160	140	80	360	110	660	180		
180	140	85	350	120	630	190		
200	140	100	350	130	610	220		
240	130	120	340	150	590	235		
280	120	130	340	170				
320	120	150	330	195	GPD = Approximate Gallons per Day in the summer in an average location in the U.S.A.			
360	120	170	320					
400	120	190	300					
440	120	210			Watts = total of solar panel watts.			
480	80	260						
520	80	310			Motor Input Voltages: 12 VDC, 24 VDC, 48 VDC, 115 VAC			
560	60	340						

1/2HP Models	Model 1408		Model 1403		Model 2607		This data shows performance at 15 or 30 VDC, Array Direct, that is, when the pump runs direct from the solar panels with no batteries.
Feet	GPD	Watts	GPD	Watts	GPD	Watts	
20	580	110	1090	1090	1860	185	
40	570	120	1080	1080	1830	240	For performance in a battery-based system, subtract 20% from the GPD and the Watts needed.
60	560	130	1080	1080	1830	250	
80	560	140	1050	1050	1810	290	
100	560	150	1050	1050	1810	330	A 24 VDC pump may by run at 12VDC to yield ½ the flow and use ½ the watts.
120	550	160	1030	1030	1800	355	
140	550	180	1030	1030	1800	390	
160	550	185	1030	1030	1780	430	Actual performance may vary by ±10%
180	540	200	1020	1020	1750	470	
200	540	210	1010	1010	1740	500	
240	530	235	1010	1010	1730	585	Motor Input Voltages: 24 VDC, 48 VDC, 115 VAC
280	540	260	990	990	1680	675	
320	520	290	990	990			
360	520	310	960	960			
400	510	330	960	960			
440	510	355	930	930			
480	510	380					
520	480	400					
560	500	435					

The Dankoff Flowlight Booster Pump provides city water pressure anywhere. It has been a standard in home renewable energy systems since 1986. It is economical for domestic water supply, drip irrigation, and water purification. If you live in a flat area and don't have gravity-feed water from a tank above your home, and you want water for your home or garden 24/7, this is the pump for you.

It runs on either rechargeable Deep Cycle batteries or AC, and uses one third to one half the energy of a conventional AC pump.

It is more powerful, quieter, and much more durable than plastic RV/Marine pumps. Wearing parts are replaceable, and typically last 5 to 10 years. Overall life expectancy is 15 to 20 years.

A booster pump is far more cost effective than an elevated tank, providing pressure equivalent to over 100 feet of elevation.

The complete instruction manual and easy installation kit make this pump simple for anyone to install and service, with no previous experience.

Suction Capacity:

- Low Speed Model: 20 vertical feet at sea level
- Standard Model: 10 feet at sea level
- Subtract 1 foot for every 1,000 feet altitude for both models. Suction capacity may be further limited if the intake pipe is too small or too long. Excessive suction causes noise and excessive wear on the pump. Use at least a 1" diameter intake pipe.

Available Models:

- Standard model 2920-V for highest flow
- Low Speed Model 2910-V (DC Only), has a higher pressure rating, and is also recommended when the suction lift is greater than 10 feet, or extra quiet operation is desired.

Available Input Voltage Options:

- 12, 24, or 48 VDC
- 120 VAC. This model has a low surge motor which minimizes inverter and wire gauge size.



Construction:

- Rotary Vane pump mechanism (pulsation free)
- Solid forged brass plump body with carbon-graphite and stainless steel working parts
- NSF® Approved for drinking water
- Handles sea water and dissolved minerals
- Survives most freezes
- Permanent magnet, ball bearing DC motor, thermally protected, (pump head requires separate, optional thermal protection module)
- Clear, flexible hoses and pressure relief valve are included

Additional Needs:

- Battery-based power system (12 or 24 VDC) or AC power from the grid, an inverter, or a generator
- Pressure tank, captive air type, minimum size 40 gallon, the larger the better
- Foot valve to maintain suction if the pump is placed higher than the water source

Filtration Requirement:

This pump cannot tolerate dirt, water must be filtered clear with a 10 micron filter. A settling tank is recommended to pre-clean dirty water.

Warranty:

One year against defects in materials and workmanship.

Accessories:

- Intake Strainer/foot valve with fine monel metal screen, stops coarse debris
- Inline filter (10") uses standard drinking water cartridges
- Intake filter/foot valve (30") replaces the 10" intake filter and intake strainer with a single unit. Recommended for use in a shallow well.
- Spare filter cartridges, either 10" or 30", 10 micron spun fiber
- Easy Installation Kit: includes pressure switch, pressure gauge, check, drain, and shut-off valves, and tank tee (manifold)
- Dry Run Switch prevents battery drain and pump damage if the water source runs dry.

Installation:

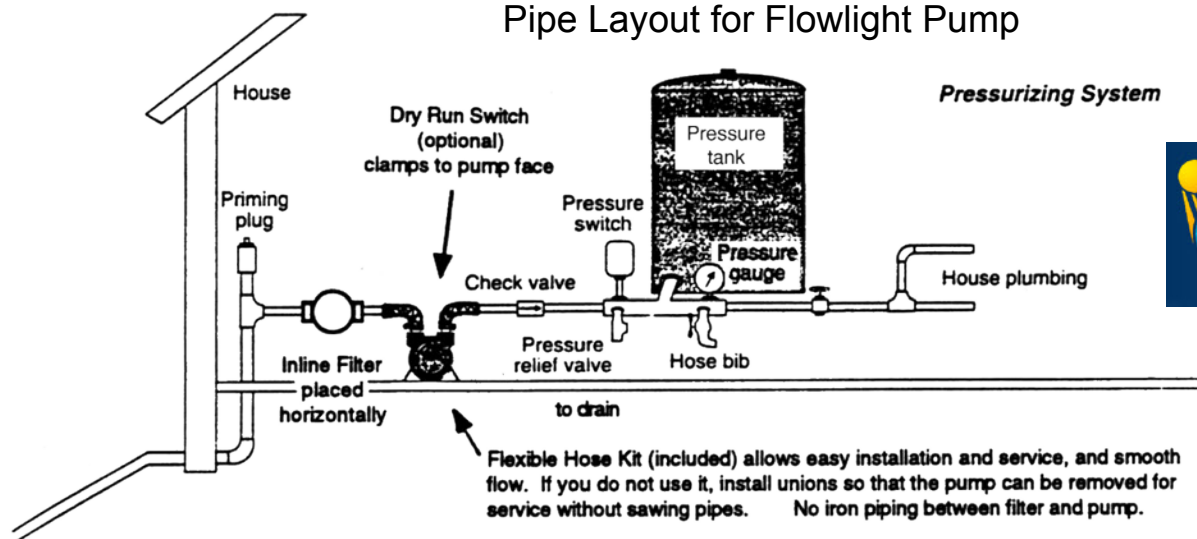
- The pump may be mounted horizontally or vertically
- The pump must not be submerged in water
- It may be placed inside a 6" or larger well casing, suspended by a rope.

Dimensions:

- Length 16.5"
- Weight 15 lbs
- Flexible hose ends have a 3/4" or 1" male pipe thread

	Standard Model 2920-V*				High Suction Model 2910-V*			
Working Pressure in PSI	30	40	50	65	30	40	50	65
Flow Rate in Gallons per Minute	4.5	4.3	4.3	4.1	3.4	3.3	3.1	2.7
Watt-Hrs** per gallon pumped	0.6	.67	.75	1.1	0.6	0.67	0.75	1.1
Current Draw								
Amps @ 12VDC	13	15	16	22	10	11	12	15
Amps @ 24VDC	6.5	7.5	8	11	5	5.5	6	7.5
Amps @ 120 VAC	1.7	2	2.1	2.9	AC data not yet available			
* V = voltage. Specify 12 VDC, 24 VDC, 48 VDC, or 120 VAC								
** Watt-Hrs are a measure of how much electricity is used, similar to measuring gallons of gasoline								

Pipe Layout for Flowlight Pump



Q. How do Dankoff SlowPumps and FlowLight Booster Pumps work?

A. Most Dankoff Pumps are designed to be powered by solar panels or batteries. The most economical way to use a Dankoff Pump is to run it "Array Direct", meaning that the pump is wired to the solar panels through a controller, and it only runs during the day, when the sun hits the solar panels. Usually two, three or four 90 watt solar panels are used. With this kind of set up, water is pumped into an open tank which gravity feeds to wherever it is needed. Dankoff SlowPump models are usually used when pumping into an open tank. Unlike many AC pumps, the Dankoff SlowPump will typically operate all day long, whenever the sun hits the panels, until the tank becomes full. Since they pump small amounts of water over a long period of time, they can be sized considerably smaller than a typical AC surface pump, which is designed to give a large blast of water for a few minutes, then shut off. Various models are available that can pump as high as 440 feet or provide as much as 1500 gallons per day. A float switch can be installed in the tank to shut off the pump when the tank becomes full.

Q. What if I need pressurized water for household use?

A. Dankoff Pump models are available which can run on battery banks. Generally the Flowlight Booster Pumps are used for this application, because they have a higher flow rate for quicker pressure tank recovery. For this application, the solar panels charge the batteries, which power the pump. Typically, two or four Deep Cycle/RV/Marine batteries are connected together to produce 12, 24, or 48 volts. The rest of the system is standard, with a pressure switch that turns off the pump when the desired pressure is reached in the pressure tank.

Q. I have AC power from the grid or my inverter, but I'd like to use Dankoff Pumps because they are simple and energy-saving. How could I do that?

A. There are Dankoff Pump models available which can run on standard 120 VAC. Be sure your inverter is large enough that it can handle the additional load.

Q. Do Dankoff Solar Pumps require a controller?

A: Pump controllers are required for SlowPumps and Flowlight Booster Pumps when used without a battery (PV array-direct). A solar array without a controller (or battery) will be unable to provide the current to start or run the pump unless the sun is very bright. It may not start until mid-day. A controller acts like the transmission in a vehicle. It lowers the voltage and raises the current to run the pump, however slowly, in low-light conditions – like shifting to low gear. The controller also protects the motor from overload and over-speed and provides low-power float switch control. Controllers will increase the performance about 30% over the course of a year.

Q. Do Dankoff Solar Pumps require a filter?

A. All Dankoff Surface Pumps require a 10 micron filter to protect the pump head. Use of these pumps without a filter will void the warranty.

Continued on next page...

Q. What water sources can I use?

A. The SlowPump and Flowlight Booster Pump can pump from springs, ponds, and creeks. They can “suck” water up from the source, so they can be installed as high as 20 feet above the water source. If your water source is dirty, it is wise to pre-clean it by running it into a settling tank or pond. The dirtier the water is, the more often the filter has to be replaced.

Q. In what type of environment should I install and keep Dankoff Solar Pumps?

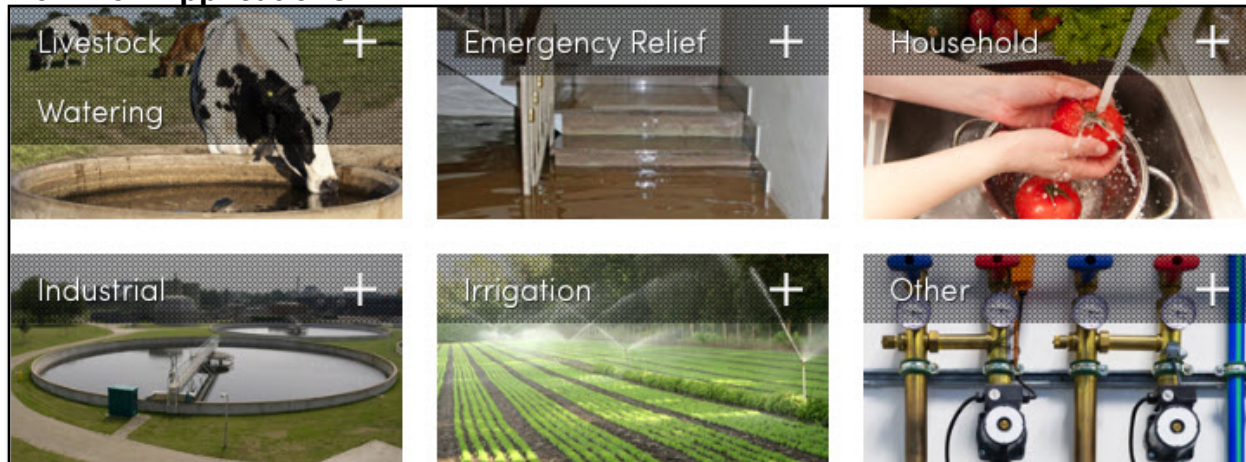
A. Dankoff Solar Pumps are not submersible. They can tolerate occasional water splash, but must be protected from extreme wet conditions including rain. The motors require some air cooling; please allow air space around the motor. Do not wrap insulation around it. Provide coverage from rain and direct sun too. If freezing is to be expected, remove the pump or drain it for the winter season. Every Dankoff pump comes with a detailed instruction manual. Please read the manual thoroughly before installation. You can download it in advance from www.highlifterpumpservice.com

Q. Why do Dankoff Solar Pump motors use brushes?

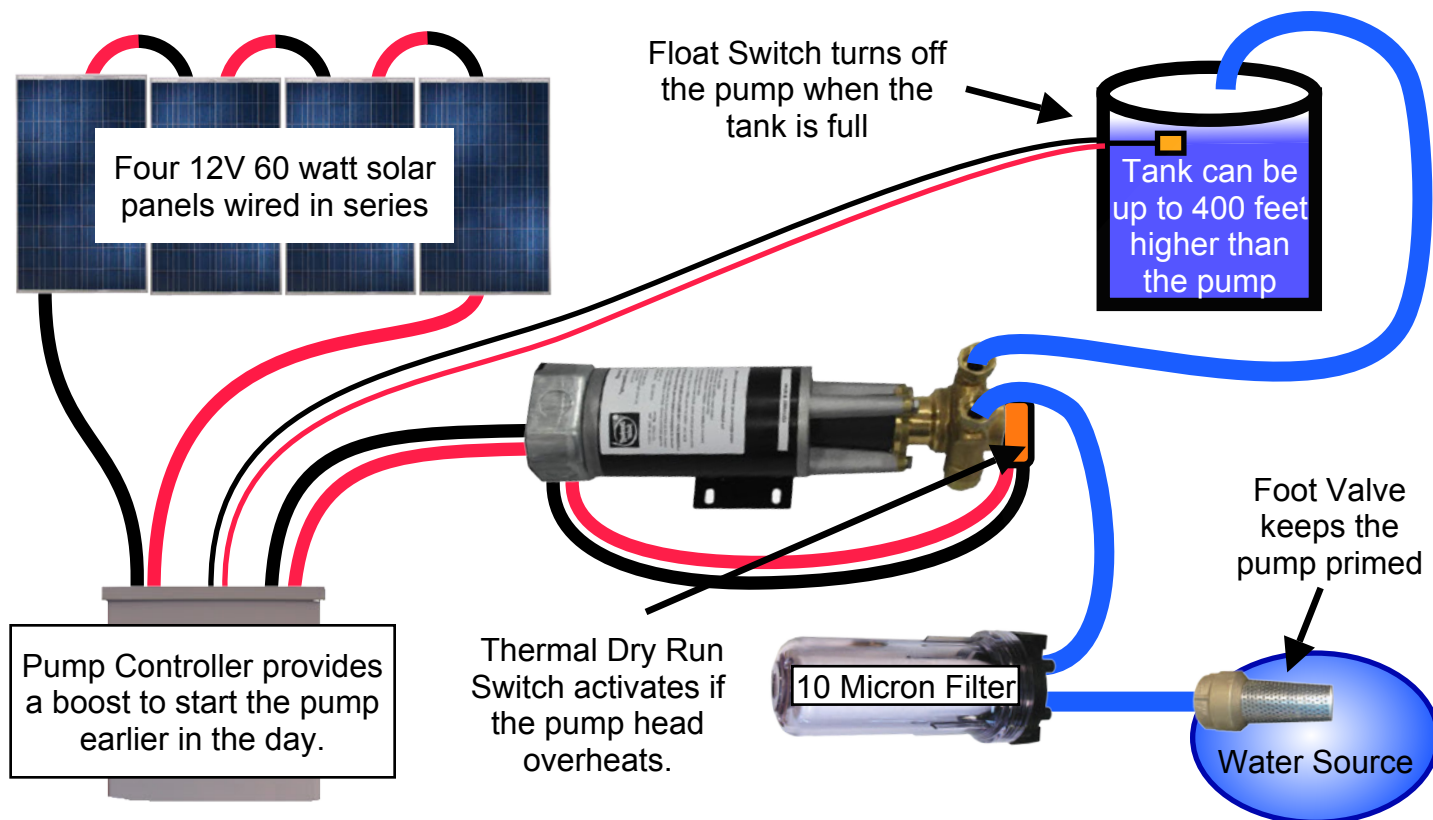
A. Dankoff Solar Pumps are designed for industrial reliability at the lowest cost. The pumps use brush-type motors for simplicity and economy. Brushes are a wearing component, but brush life generally exceeds 10 years. Brushes are easy to inspect and replace, taking just a few minutes. The instruction manuals have further advice on predicting brush life and replacing them. A brush motor offers great simplicity and low cost because it runs from DC power directly with no need for conversion to AC. Brushless motors cost much more and are not of great advantage for surface pumps. Pumps with brush-type motors and positive displacement pump heads, such as the SlowPump and the Flowlight Booster Pump, are the most energy efficient type of pump available.

Q. Do Dankoff Solar Pumps have dry run protection?

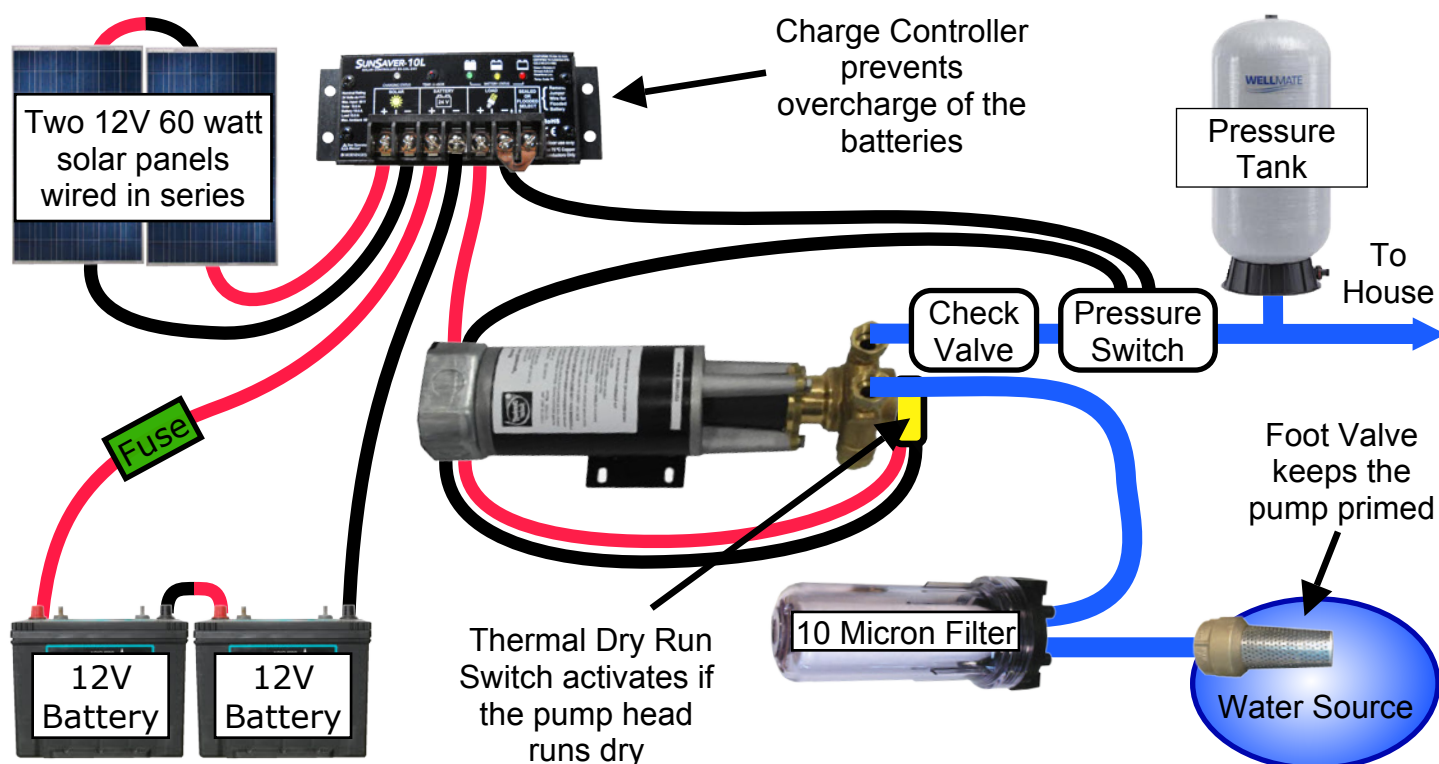
A. The Slowpump and the Flowlight Booster pump have an optional Dry Run switch which attaches to the pump head. If the pump head should overheat due to lack of water, the dry run switch will turn off the pump. It will then have to be reset manually after the pump head cools down. To prevent permanent damage to the pump head, we strongly recommend that you purchase the Dry Run switch for your Slowpump or Flowlight Booster pump.

Common Applications:

Example: Model 1308-48 Slowpump (Array Direct, no batteries)



Example: Model 2930-24 Flowlight Booster Pump (with batteries)



1. Decide if you need a SlowPump or a Flowlight. If you have a tank on a hill that gravity feeds to your home, you can use a Slowpump and no batteries. If you live on flat land and use a pressure tank to provide water to your home, use a Flowlight with batteries.
2. Decide on the DC System Voltage. For systems less than 200 watts, you can use 12 or 24 volts. For systems over 200 watts, 48 volts is better. Higher voltage is better if you need to put the solar panels far away from the pump. The higher the voltage, the smaller gauge cable you can use, which saves money.
3. Figure out how high you need to pump. There are several ways to do that: 1) get a GPS unit and walk your property. 2) Find your property on GoogleEarth. You will see altitude readings at the bottom for every place you rest your cursor. 3) Lay out your pipe fill it with water, and take a pressure gauge reading at the bottom. 1 pound on the gauge = 2.3 feet of elevation.
4. Figure out how much water you need per day. An average cabin with a small garden uses about 200 to 300 gallons per day.
5. Look at the Daily Output Chart to choose your pump. Start with the 1/5 HP chart and if you can't find a suitable pump, look at the 1/2 HP chart. For example, if you need to pump to 240 feet and you need 500 gallons per day, you can see that the Model 1408 will give you 530 gallons per day at 240 feet Lift and will use 235 watts of solar.
6. To figure out which solar panels you need, divide the Total Solar Watts by four. $235 \text{ watts} / 4 = 58.75 \text{ watts per solar panel}$. 60 watts is the nearest size that is available. It's OK to go with a larger solar panel, it won't hurt the pump, and will actually give you even more water. So you would need four 60 watt panels.
7. Choose the DSP-200 Pump Controller for SlowPump installations. Choose a 12, 24, or 48V Charge Controller for Flowlight (Battery-Based) systems.
8. Choose your wire size according to the Wire Sizing Chart. Don't skimp on the wire between your solar panels and your pump, that reduces output.
9. **High Lifter Pump Service is ready to help you design your solar electric pumping system and help you choose the right equipment for your needs. Call 707-923-2109 or email info@highlifterpumpservice.com for assistance 7 days a week.**

Basic items you will need for a SlowPump installation. Does not include all the little plumbing fitting or other small items.

1. Pump
2. Dry Run Switch
3. Solar Panels
4. Pump Controller
5. Float Switch (if you want to shut off the pump when the tank is full)
6. 10 Micron Filter Assembly
7. Foot Valve
8. Electric Cable
9. Pipe

1. Determine how much water you need per day. An average household of four people might use 300- 700 gallons per day. There is an online calculator here:
<https://www.swfwmd.state.fl.us/conservation/thepowerof10/>
2. Choose the Standard model if the pump is less than 10 feet above the water source. Choose the Low Flow model if the pump needs to be between 10 and 20 feet above the source, or you want a quieter pump, or you need higher household water pressure.
3. Divide the Gallons per Day needed by 4. This gives the array size for most areas in the US. If you need 400 gallons per day, you would need $400/4 = 100$ watts of solar panels.
4. If your system is 24 volts, you could use two 60 watt solar panels for this example. If your system is 48 volts, you would want four 30 watt solar panels. These examples total to 120 watts, but you should size the solar panels larger than you think you need to provide extra output during cloudy periods.
5. **High Lifter Pump Service is ready to help you design your solar electric pumping system and help you choose the right equipment for your needs. Call 707-923-2109 or email info@highlifterpumpservice.com for assistance 7 days a week.**

Voltage Drop Index Method of Wire Sizing

$$\frac{\text{Amps} \times \text{One Way Distance}}{\text{Voltage} \times \text{Percent Loss}} = \text{VDI}$$

VDI	Gauge
1	16
2	14
3	12
5	10
8	8
12	6
20	4
34	2
49	1/0
62	2/0
78	3/0
99	4/0

Example:

10 Amps of current

100 feet one way distance

No more than 2% loss is recommended

$10 \times 100 = 1000$

$24 \times 2 = 48$

$1000 \text{ divided by } 48 = 20.83$

The nearest VDI in the chart is 20, so the recommended wire size is 4 gauge.

Item #	SlowPumps	Price
77-130812	Dankoff Slowpump 1303-12 for PV or Batteries	735
77-130824	Dankoff Slowpump 1303-24 for PV or Batteries	735
77-130348	Dankoff Slowpump 1303-48 for PV or Batteries	735
77-130311	Dankoff Slowpump 1303-115VAC	992
77-130812	Dankoff Slowpump 1308-12 for PV or Batteries	735
77-130824	Dankoff Slowpump 1308-24 for PV or Batteries	735
77-130848	Dankoff Slowpump 1308-48 for PV or Batteries	735
77-130811	Dankoff Slowpump 1308-115VAC	992
77-130812	Dankoff Slowpump 1322-12 for PV or Batteries	735
77-130824	Dankoff Slowpump 1322-24 for PV or Batteries	735
77-130848	Dankoff Slowpump 1322-48 for PV or Batteries	735
77-130811	Dankoff Slowpump 1322-115VAC	992
77-250712	Dankoff Slowpump 2507-12 for PV or Batteries	770
77-250724	Dankoff Slowpump 2507-24 for PV or Batteries	770
77-250748	Dankoff Slowpump 2507-48 for PV or Batteries	770
77-250711	Dankoff Slowpump 2507-115VAC	1017
77-140824	Dankoff Slowpump 1408-24 for PV or Batteries	1294
77-140848	Dankoff Slowpump 1408-48 for PV or Batteries	1332
77-140811	Dankoff Slowpump 1408-115 VAC	1292
77-140324	Dankoff Slowpump 1403-24 for PV or Batteries	1294
77-140348	Dankoff Slowpump 1403-48 for PV or Batteries	1332
77-140311	Dankoff Slowpump 1403-115 VAC	1292
77-260724	Dankoff Slowpump 2607-24 for PV or Batteries	1365
77-260748	Dankoff Slowpump 2607-48 for PV or Batteries	1404

Continued on next page...

Item #	Flowlight Pumps	Price
77-291012	Dankoff Flowlight 2910-12 VDC Standard for Batteries	799
77-291024	Dankoff Flowlight 2910-24 VDC Standard for Batteries	799
77-291048	Dankoff Flowlight 2910-48 VDC Standard for Batteries	799
77-292012	Dankoff Flowlight 2920-12 VDC Low Flow for Batteries	817
77-292024	Dankoff Flowlight 2920-24 VDC Low Flow for Batteries	817
77-292048	Dankoff Flowlight 2920-48 VDC Low Flow for Batteries	817
77-292011	Dankoff Flowlight 2920-115 VAC Low Flow for Batteries	1039

Item #	Accessories	Fits	Price
77-110260	Pressure Switch, Reverse Action	F	107
77-290000	E-Z Install Kit for Flowlight. Contains: Brass Manifold, Ball Valve, Check Valve, Pressure Gauge, Pressure Switch, Hose Bibb, and fittings.	F	139
77-110020	Float Switch, Close on Fall	S	60
77-110030	Float Switch, Close on Rise	S	60
77-110690	DSP-200 Pump Controller for 12, 24, or 36 VDC Input and 12 or 24 VDC Output	S	303
77-110340	10" Filters, 2 Pack, 10 Micron Spun Fiber Filter	SF	14
77-110170	3/4" Check Valve, Lead Free Bronze	SF	35
77-110250	1" Check Valve, Lead Free Bronze	SF	39
77-110360	30" Filters, 3-Pack (10 Micron)	SF	50
77-110440	1 1/4" Foot Valve, Lead Free Bronze	SF	54
77-131400	Dry Run Switch 1300/1400 Series	SF	77
77-252600	Dry Run Switch 2500/2600 Series	SF	77
77-110330	Inline Filter Housing, 10", with 3/4" FNPT Ports and One 10 Micron Spun Fiber Filter, Mounting Bracket, and Filter Wrench	SF	85
77-110350	30" Filter/Foot Valve Assembly, plus Spare Filter	SF	110
77-110450	2" Foot Valve, Lead Free Bronze	SF	132
77-110000	2" Check Valve, Lead Free Bronze	SF	139

*S fits Slowpump; F fits Flowlight; SF fits both Slowpump and Flowlight

handy well pump



HWP-304 Stainless Steel Hand Well Pump

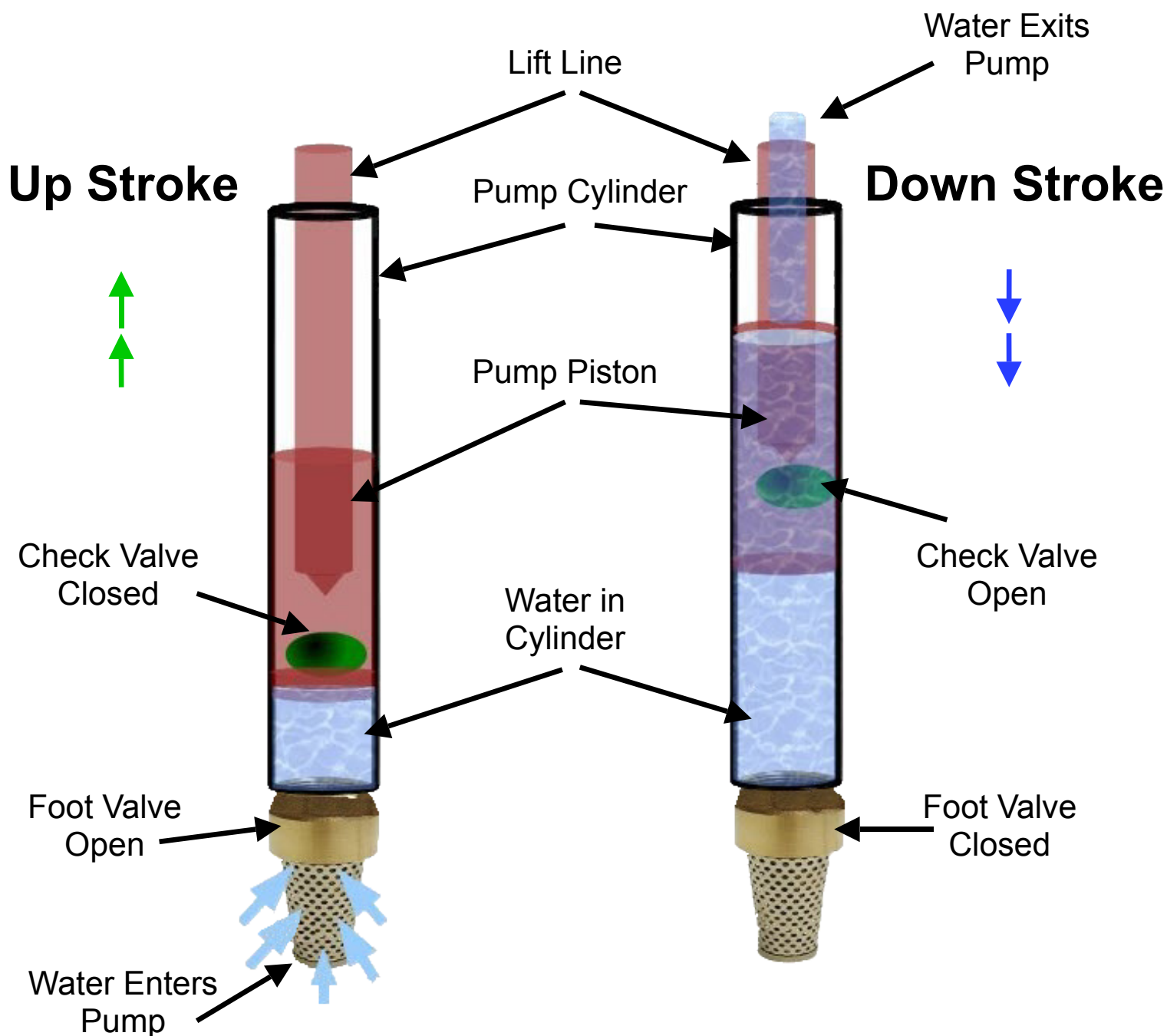
is our solution to expensive permanent hand well pumps. It is very durable while priced less than most emergency pumps. Its simple rugged design makes it the perfect choice for your hand operated applications.

The Handy Well Pump Model HWP-304 will work in wells up to 200' deep. It's simple design and ease of operation make it a perfect choice for your permanent hand pumping application. It has a simple yet efficient pumping mechanism that requires little to no maintenance. It incorporates stainless steel components on critical areas of the pump and handle that make it very reliable.



- Works without any fuel or electricity.
- Great for emergency pumping - when utility power is out or the generator is out of gas.
- Fits alongside your existing pump.
- Works in wells as small as 2" in diameter.
- Connect a garden hose and fill a tank directly from the pump.
- No danger of freezing if installed according to instructions.

16-1304 Handy Well Pump\$239.00



On the **Up Stroke** the Handy Well Pump pulls water into the pump cylinder by raising the pump piston to the upper portion of the pump cylinder chamber. Each up stroke then pulls more water into the pump cylinder.

On the **Down Stroke** the water is forced into the pump piston and then into the lift line on the way to the well head. Each down stroke pushes more water into the lift line and then out the well head to wherever you need your water directed.



Well Seals for the Handy Well Pump. Available in 4", 5", 6", and 8" diameter. You will need one if you are installing in a well that already has a well pump.

- 1 1/4" offset opening sized to fit the Handy Well Pump.
- 1" opening for your current pump pipe.
- 1/2" threaded opening for your current pump's electrical feed.
- Stainless Steel eyebolt for attaching a safety rope.



16-1334 4" Well Seal\$29.95

16-1335 5" Well Seal\$32.95

16-1336 6" Well Seal\$36.95

16-1338 8" Well Seal\$48.95



This pressure tank is designed to equalize the flow of water during a pump stroke so that there is a constant stream of water while you pump. Take a shower, fill a toilet or fill the kitchen sink through your house watelines by using the Handy Well Pump and this tank. Just connect a garden hose from the pump to the tank and a garden hose from the tank to your water system in your house.

16-1320 Handy Pump Booster Tank\$79.00

Water, Wherever, Whenever.

In remote locations, the most abundant energy source might be sunlight. The SQFlex water pumping system is designed to operate with energy provided by solar panels and variety of other sources such as wind turbines, generators, and batteries. When powered by solar panels, the pump runs when the sun shines. Water can be pumped to a non-pressurized tank which gravity feeds to a home or farm operation. The tank provides water storage when the sun is not shining. Thus no batteries are needed for solar operation.

It just makes more sense to harness the sun for water pumping instead of hauling fuel to the pump. There are a wide variety of SQFlex pumps which can handle water depths from 6 feet to 800 feet.



SQFlex Pump Features:

- Easy installation, very low maintenance.
- Various models can provide from 1000 gpd to 40,000 gpd
- Most applications will use 2 to 6 245 watt solar modules.
- The pump can be set up to fill either an open tank or a pressure tank.
- A dry run switch in the cable 2 feet above the pump will shut off the pump if the water level in the well drops too low.
- Pump can run on a generator when needed.
- Pump can run on 90 to 240VAC or 30 to 300VDC with no external boxes needed. Just connect the pump to the power source.

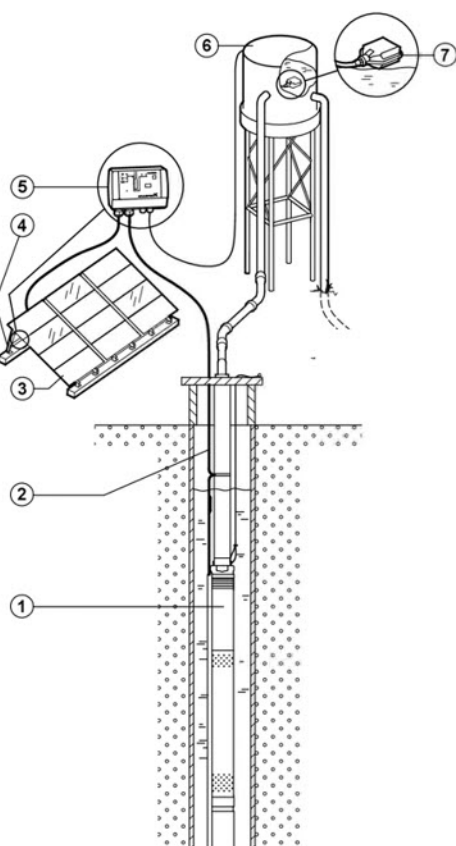
CU200 Control Box features:

- LEDs on the front panel will indicate various conditions such as a bad connection, etc.
- Provides a connection point for the Float Switch and other control boxes such as the Generator Switch Box.

Float Switch Features:

- Shuts off the pump when the tank is full.
- Float Switch can be located as far as 1600 feet from the pump, connected via an 18 ga 2 conductor wire.

Both the CU200 box and Float Switch are optional.



1. SQFlex Pump
2. Submersible Pump Cable
3. Solar Panels
4. Mounting Rails
5. CU200 Control Unit
6. Tank
7. Float Switch

75-10xx SQFlex Pump all models	\$2,195.00
75-1033 CU200 Controller	\$429.00
75-1042 Float Switch.....	\$28.95

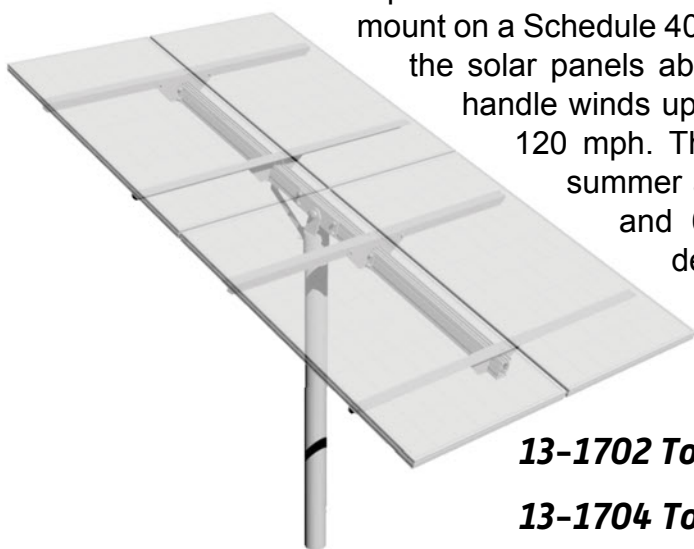
All production figures are approximate. Output will vary depending on the location and season.

	Module watts	230	230	230
GRUNDFOS	Qty of modules	2	4	6
	Array watts	460	920	1380
25 feet	Pump Model	40 SQF-3	60 SQF-3	60 SQF-3
	Summer	13,000	26,300	35,600
	Winter	9,500	19,800	27,200
	Max flow in gpm	24	52	62
50 feet	Pump Model	11 SQF-2	40 SQF-5	40 SQF-5
	Summer	5,500	14,800	22,400
	Winter	4,200	10,600	16,500
	Max flow in gpm	9	32	40
75 feet	Pump Model	11 SQF-2	25 SQF-7	40 SQF-5
	Summer	4,500	9,200	14,600
	Winter	3,400	6,600	10,100
	Max flow in gpm	8	20	27
100 feet	Pump Model	11 SQF-2	11 SQF-2	25 SQF-7
	Summer	3,600	6,700	10,800
	Winter	2,600	5,400	7,600
	Max flow in gpm	6	12	19
125 feet	Pump Model	11 SQF-2	11 SQF-2	11 SQF-2
	Summer	2,900	6,100	7,700
	Winter	2,000	4,800	5,600
	Max flow in gpm	5	12	14
150 feet	Pump Model	6 SQF-2	11 SQF-2	11 SQF-2
	Summer	2,450	5,650	6,950
	Winter	1,850	4,200	5,550
	Max flow in gpm	4	12	12
175 feet	Pump Model	6 SQF-2	11 SQF-2	11 SQF-2
	Summer	2,300	5,000	6,650
	Winter	1,700	3,600	5,200
	Max flow in gpm	4	11	12
200 feet	Pump Model	6 SQF-2	11 SQF-2	11 SQF-2
	Summer	2,000	4,200	6,200
	Winter	1,500	3,000	4,800
	Max flow in gpm	4	9	12
250 feet	Pump Model	6 SQF-2	6 SQF-2	11 SQF-2
	Summer	1,600	3,000	5,200
	Winter	1,100	2,400	37,600
	Max flow in gpm	3	5	9
300 feet	Pump Model	6 SQF-3	6 SQF-3	6 SQF-3
	Summer	1,500	3,050	3,550
	Winter	1,100	2,450	2,950
	Max flow in gpm	3	6	6
400 feet	Pump Model	3 SQF-3	6 SQF-3	6 SQF-3
	Summer	950	2,600	3,200
	Winter	700	1,950	2,550
	Max flow in gpm	2	5	6
500 feet	Pump Model	3 SQF-3	6 SQF-3	6 SQF-3
	Summer	800	2,000	2,850
	Winter	600	1,400	2,200
	Max flow in gpm	2	4	6
650 feet	Pump Model	3 SQF-3	3 SQF-3	6 SQF-3
	Summer	500	1,300	2,150
	Winter	300	1,000	1,500
	Max flow in gpm	1	2	4
800 feet	Pump Model	Too few pv modules	Too few pv modules	6 SQF-3
	Summer			1,300
	Winter			800
	Max flow in gpm			2



The Hanwha 245 watt module is bargain priced and is an ideal size and voltage for strings of modules to power the SQFlex pump. Since the SQFlex can accept from 30 to 300 DC volts, the best way to power the pump with solar panels is to string them together in series. You can connect from 2 to 6 in series. See the Output Chart for recommendations on how many solar panels to use. Series connection means just connect the positive lead of one panel to the negative lead of the next panel. Caution: the more panels you string together, the higher the voltage. Take care when handling DC voltage over 48 volts, and voltage over 100VDC is considered dangerous. To increase safety, cover the PV array with a tarp when you are working on the wiring. 25 year warranty.

11-6512 Hanwha 245 watt solar module\$225.00



A Top of Pole Mount is an ideal support structure for solar panels. These racks mount on a Schedule 40 or 80 steel pole (sourced in your local area) to keep the solar panels above any animal damage. The standard grade can handle winds up to 90mph. The High Wind Option can handle up to 120 mph. The tilt is manually adjustable for increased output summer and winter. There are models available to hold 2, 4, and 6 solar panels. Pole size would be 3", 4" or 6" depending on the particular mount chosen.

13-1702 Top of Pole Mount for 2 solar panels\$349.00

13-1704 Top of Pole Mount for 4 solar panels\$595.00

13-1706 Top of Pole Mount for 6 solar panels\$995.00

Use a PV Connection Cable as an extension cord to connect the array to the sub pump cable or CU200 box.

52-9416 PV Connection Cable, 30 feet with Male and Female connector\$39.95

The Grundfos SQFlex takes a 10 gauge 2 conductor cable with ground.

75-1638 Submersible Pump Cable 10-2C with ground\$1.99 per foot



Features:

- Long -life 24 VDC operation, either batteries or solar panels
- For 4" wells or larger
- Quick disconnect with water tight gland nut
- Corrosion-proof housing with stainless-steel fasteners
- Runs dry without damage
- 50 mesh stainless steel inlet screen
- State of the art solid diaphragm
- Maximum pump lift is 230 feet
- Maximum 700 gallons per day
- Can be overhauled with simple hand tools. 3-5 years between overhauls
- Measures only 3.75" diameter x 12" long
- A complete pumping system including pump, solar panels, controller, and 100 feet of cable is less than \$850.00

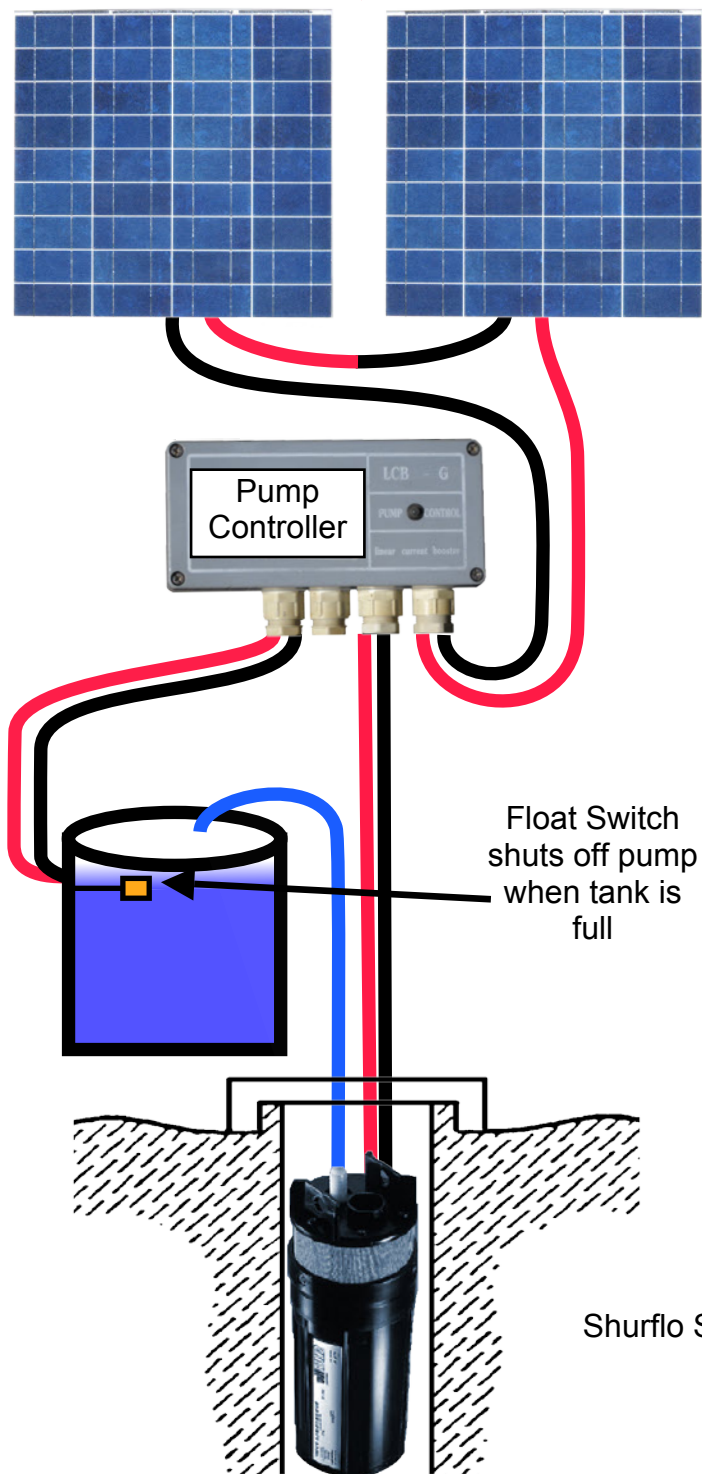
An economical solution to your remote water pumping needs, the Seaflo delivers a steady 60-75 gallons per hour. The maximum pumping height is 230 feet. If you are pumping into an open tank, it can run directly from solar panels, with no batteries needed. If you need pressurized water 24/7, it can run off a couple of car batteries charged by solar panels. Great for livestock watering, irrigation, pond aeration, remote homes and cabins. This is a "diaphragm" pump with a "brush" type motor, which is a very efficient design, allowing it to be powered by two 50 to 75 watt solar panels. The diaphragm and motor brushes should be replaced every three to five years, depending on how hard the pump has worked. Use 2 conductor submersible pump cable in the well. A pump controller can also be useful if you need to shut off the pump when a tank is full. Rated for potable water. One year warranty.

75-5817 Shurflo Submersible Pump\$649.00

“Open Tank” Set Up

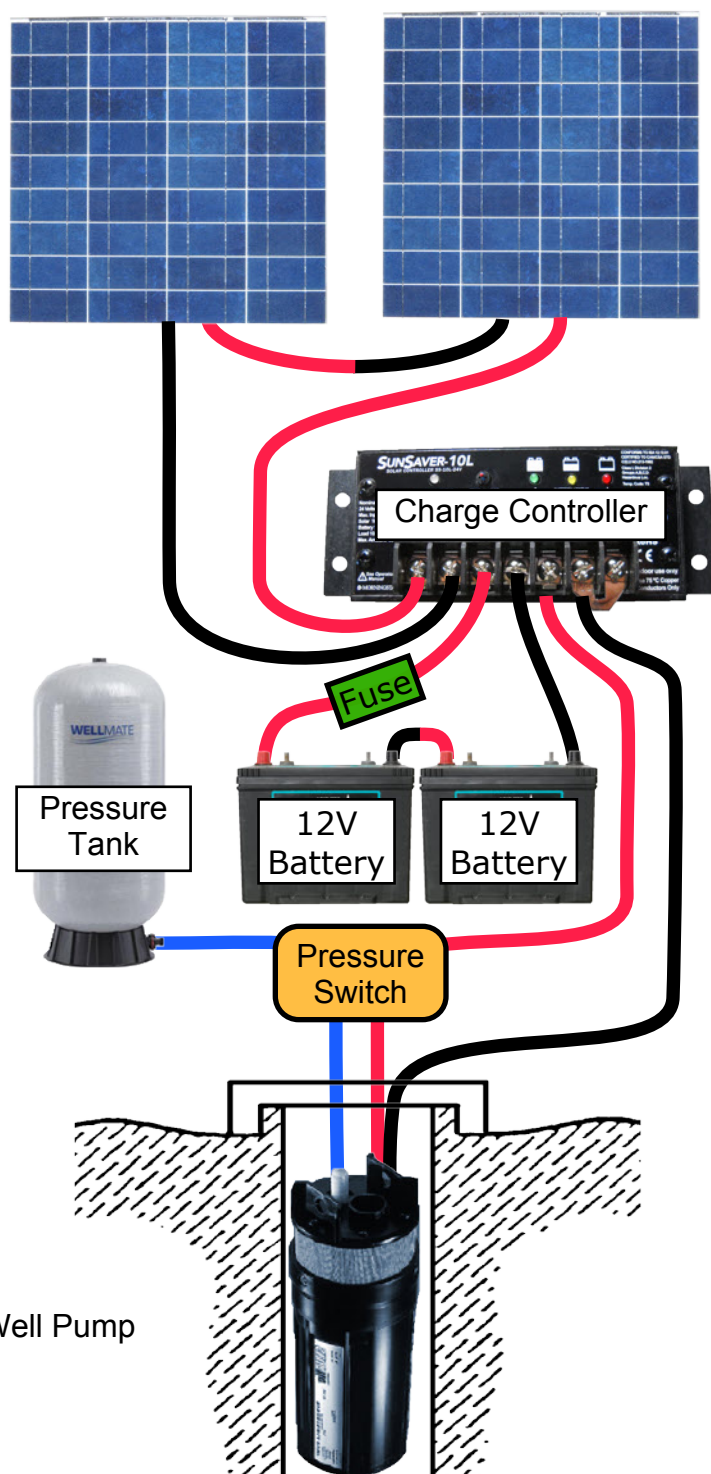
Pump is set up to run without batteries. Pump runs when the sun shines and pumps into an open tank which gravity feeds to your home.

Two 12 volt 60 watt solar modules wired in series to make 24 volts



“Pressure Tank” Set Up

Pump is set up to run on batteries which are charged by solar modules. Pump runs when pressure drops in the pressure tank.



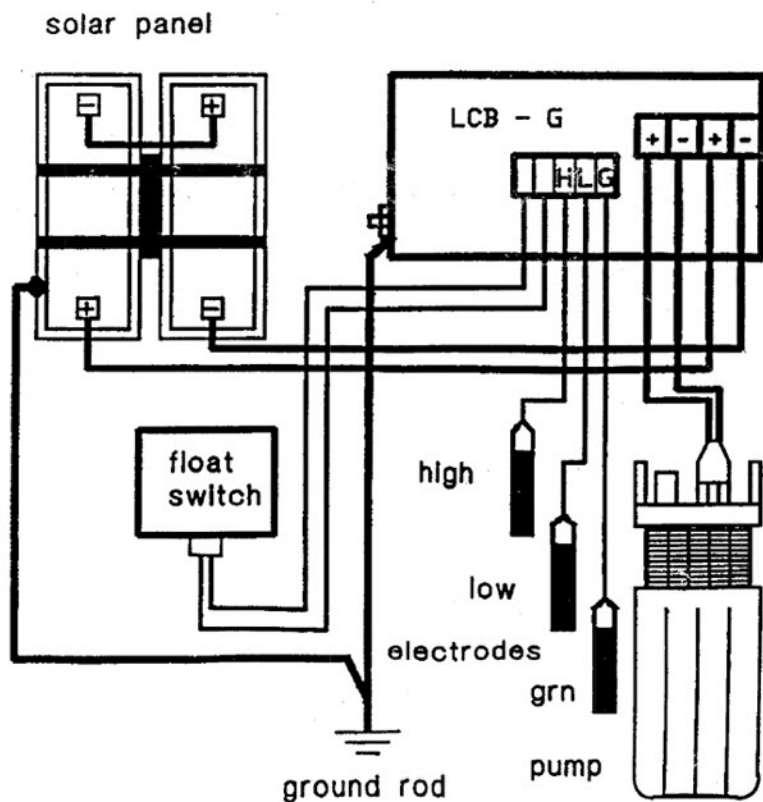
24 VDC Flow Chart

Lift in Feet	Flow Rate In Gallons Per Hour	Minimum Solar Array	Amps Used
20	117	58	1.5
40	114	65	1.7
60	109	78	2.1
80	106	80	2.4
100	103	99	2.6
120	101	104	2.8
140	99	115	3.1
160	98	123	3.3
180	93	136	3.6
200	91	141	3.8
230	82	155	4.1

12 VDC Flow Chart

Lift in Feet	Flow Rate In Gallons Per	Minimum Solar Array	Amps Used
20	56	22	1.2
40	54	28	1.5
60	52	33	1.8
80	50	37	2.0
100	49	40	2.1
120	47	45	2.4
140	46	51	2.7
160	44	56	3.0
180	43	61	3.3
200	41	64	3.4
230	36	72	3.9

For best output use two 12V solar panels in series to make 24 volts. From the 24V output chart, you can see that if the water level in the well is 120 feet below your tank, you will need at least 104 watts of solar panels. If you use two 55 watt panels in series that's a total of 110 watts. Add 10% more watts if you use a pump controller. It's OK to use panels that are larger than the minimum needed, no damage occurs, the pump will only use the watts it needs.



Wiring diagram for the Shurflo Submersible Pump. The LCB-G Pump Controller helps increase pump output but it is optional if you do not need a Float Switch or Dry Run control.

High Lifter Pump Service is always available to help you with advice on installation of any product in our catalog.

You can use either 60 watt or 90 watt solar modules. Use 90 watt modules to pump from depths greater than 100 feet.



Dasol 60 watt solar module features:

- 12 volt 3.3 amp solar panel, connect two in series to make 24VDC
- Measures 27.2 x 26.2 x 1.4"
- Aluminum frame, glass front
- Rear Junction Box for attaching cables
- Multicrystalline type cells
- Weight 12.3 lbs
- 25 year warranty

11-8961 Dasol 60 watt solar module\$99.00



Dasol 90 watt solar module features:

- 12 volt 5 amp solar panel, connect two in series to make 24VDC
- Measures 39.0 x 26.2 x 1.4"
- Aluminum frame, glass front
- Rear Junction Box for attaching cables
- Multicrystalline type cells
- Weight 17.2 lbs
- 25 year warranty

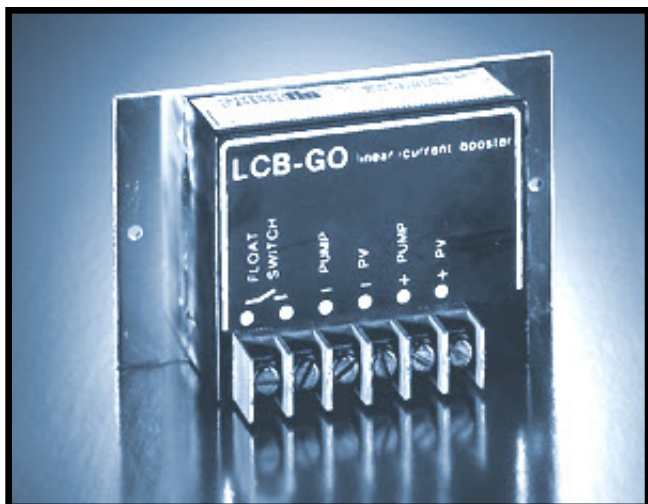
11-8962 Dasol 90 watt solar module\$159.00

You will also need Submersible Pump Cable for your Shurflo 9300. This cable is designed to withstand immersion in water. Other types of cable will allow water inside the insulation which can result in corrosion and failure of the cable.

75-1637 Submersible Pump Cable, 10-2C, no ground.....\$2.29 per foot

If you want to shut off the pump when the tank is full, you will need a Float Switch. Install it in the tank and run an 18 ga or greater two conductor cable to the pump controller.

75-1042 Float Switch.....\$28.95



Pump Controller 902-100 Features:

- Operates on 24 VDC
- Increases daily water output up to 30%
- System starts pumping earlier in the morning
- System stops pumping later in the evening
- Protects pump from low or high voltage conditions
- Terminals for float switch

Boost your DC Solar Pump's performance by up to 30%. The Pump Controller optimizes your solar water pumping system by boosting the current available from the solar panels. In addition, with the optional float switch installed, the controller will automatically stop the pump when the tank is full. The 902-100 control must be mounted in a dry location and used with a 24VDC array. It is not suitable for 12VDC operation. One year warranty

75-5823 Seaflo Pump Controller basic \$129.00



Pump Controller 902-200 Features:

Includes all 902-100 features plus:

- Switch selectable for 12 VDC or 24 VDC operation
- Pump On / Off switch
- Water tight enclosure and cable inlets
- Includes dry run shutoff feature with probes and cables

The versatile 902-200 has all the features of the 902-100 and more. This controller is switch selectable for 12 VDC or 24 VDC operation and includes a manual on/off switch for easy pump maintenance. The controller comes with high / low water level sensors. The sensors hang in the well and are used to prevent dry running in very low yield wells, so the pump will not run when the well water is too low. Weather proof enclosure. Sensor wires included. Maximum power 150 watts. One year warranty.

75-5820 Seaflo Pump Controller with low water probes \$249.00



Dasol Backup Power System

This emergency power system comes with a 10 watt solar panel, 3 hanging LED lights, a lithium-ion battery pack, two USB chargers to keep your cell phone and computer going, and an AC charger for quick battery charging.

11-1011 Dasol Backup Power System.\$149.00



Coleman Powerchill™ Thermoelectric Cooler - Model 5644-710

The Powerchill Thermoelectric Cooler uses electricity from your vehicle or solar panel to cool its interior up to 40° below the surrounding temperature without using any ice. Its motor design delivers quiet, long lasting performance. Use it standing upright or in the more traditional chest position. You can set up the door to open from the left or right. Comes with an adjustable shelf divider and molded handles for easy lifting and carrying. This 44-can capacity cooler is great for cars, RVs, or campers thanks to its cigarette lighter plug. It can also run off a household receptacle with the AC adapter (sold separately). Measures 21.75" x 15" x 17.13". Weight 17 lbs. Made in USA.

80-5644 Coleman Powerchill Thermoelectric Cooler\$99.95



This 110 VAC power supply module enables you to run the cooler from a generator or your household receptacle.

80-5701 AC Adapter for Coleman Powerchill\$29.95

How to order:

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- Call: High Lifter Pump Service at 707-923-2109
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Also visit our website to find out lots more info on the items in this catalog.

And we offer repair and repair parts for various small water pumps:

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Send pumps for repair:

By US Mail:

High Lifter Pump Service
PO Box 1640
Redway, CA 95560 USA

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Be sure to include your return address, phone, email, etc, and a description of the problem. Most repairs cost about \$200

***The High Lifter
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Springtime in Humboldt County, California